

ABSTRACT OF THE DISCLOSURE

A two-step gasification process and apparatus for the conversion of solid or liquid organic waste into clean fuel, suitable for use in a gas engine or a gas burner, is described. The waste is fed initially into a primary gasifier, which is a graphite arc furnace. Within the primary gasifier, the organic components of the waste are mixed with a predetermined amount of air, oxygen or steam, and converted into volatiles and soot. The volatiles consist mainly of carbon monoxide and hydrogen, and may include a variety of other hydrocarbons and some fly ash. The gas exiting the primary gasifier first passes through a hot cyclone, where some of the soot and most of the fly ash is collected and returned to the primary gasifier. The remaining soot along with the volatile organic compounds is further treated in a secondary gasifier where the soot and the volatile compounds mix with a high temperature plasma jet and a metered amount of air, oxygen or steam, and are converted into a synthesis gas consisting primarily of carbon monoxide and hydrogen. The synthesis gas is then quenched and cleaned to form a clean fuel gas suitable for use in a gas engine or a gas burner. This offers higher thermal efficiency than conventional technology and produces a cleaner fuel than other known alternatives.